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CONSTRAINTS IN AGRICULTURE DEVELOPMENT IN UTTARAKHAND: SOME POLICY OPTIONS

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INTRODUCTION

Uttarakhand, a hilly and mountaneous region, is a part of a predominantly flat land state, Uttar Pradesh which geographically falls mostly in the plains. The geographical area of the region constitutes 51.124 thousand sqr. kms. accounting for nearly 17 per cent of the state's area. According to 1991 census the population of Uttarakhand is 5.93 millions constituting 4.3 per cent of the population of U.P. The economy of the region is predominantly based on agriculture. Activities related to agricultrue are providing employment opportlunities to around two third of regions workforce. Accounting for the commodity-producing sectors, agriculture (including animal husbandry and fishing), contributes about 67 per cent to the net domestic output of Uttarakhand. The short-term trends suggests that the dominance of agricutlure is increasing; its share in NDP increased from 64 per cetn in 1987-88 to 67 per cent in 1991. But the share of 'primary sector' as a whole declined from 79 to 76 per cent due to sharp decline of NDP from 14 to 9 per cent in the share of forestry and logging.

While the agriculture is the dominant economic activity in all districts, its share is higher in purely hilly district like Tehri (85 per cent) followed by Pithoragarh (83 per cent) and lowest in districts such as Dehradun (55 per cent) followed by Nainaital (57 per cent), which larger part is covered by the plains, to the NDP of respective districts. Dependency of population on agriculture and related activities, both for livelihood and employment is well reflecting in almost the districts of the region, but it is somewhat at higher extent in purely hilly and mountaneous districts than in the districts which a significant part of the area falls in the plains. In fact the pressure of population is consistantly increasing on agricultural activities due to lack of employment opportunities in other economic sectors such as secondary and tertiary economies.

During the past, several kinds of initiatives have been undertaken for increasing crop productivity such that additional employment opportunities could be created for increasing labourforce. Introduction of various land development programmes and schemes, soil conservation, development of improved variety of seeds, fertilisers and pesticides with improving their deistribution system and bringing improvements in the technology of production by introducing mini tractors in valley areas of the hills are the most important policy measures which are emphasised under the past development programmes for agriculture. However, due to certain geographical and topographical problems and

lack of irrigation facilities available in most mountain areas, the application of modern pesticides and fertilizers and use of improved variety seeds have not been successful. As the consequences the growth in the yield rates of major foodgrains have been almost stagnant for the past several years.

LAND USE PATTERN

In Uttar Pradesh, a major land area is reported under forest while only 12.5 per cent of the total areas is brought out under the cultivation of agricultural crops. In fact, a major proportion of the net area shown for cultivlation is not used for growing agricultural crops regularly for every crop season as farmers are practicising to leave a sizeable proportion of land uncultivated for atleast one crop season on rotation basis for alternate year just to re-obtain the fertility. The land reported as fallow on account of its low productivity, because of lower level of fertility containts available on it, has also been consistantly increaasing over the years. This category of land was 53.1 thousand hectares in 1982-83, which increased to 56.6 thousand hectares in 1987-88 and 72.7 thousand hectares in 1992-93. And thus, out of the 662.6 thousand land area reported as cultivated land, only 436.9 thousand land area is actually used for growing agricultrue crops for both rabi and kharif cropping seasons regularly. We thus find very small size of land area is used for the cultivation of agricultural crops in Uttarakhand, in

fact only 8 per cent of the total reported land area could possibly be available for cultivation symultaneously for both rabi and kharif crops. On the other, a larger proportion of 66 per cent cultivable land area cannot be used for growing foodgrains symultaneously for two agricultural seasons because this is the marginal category of land with low level of fertility on its soil.

Carrying out agricultural activities in Uttarakhand has been recognised very un-economic but due to non-availability of employment opportunities in other economic activities the people are bound to engaged on it. In fact, the pressure of population on agricultural activities has been consistantly declining partly due increasing rate of outmigration of labourforce and partly by frequent shift of labourforce from agriculture to other economic sectors. Even the interest of farming community in carrying out agricultural operations has been declining over the years. As it is evident from the fact that actual land area brought out in cultivation and gross cropped area have been consistently decreasing atleast for last one decade. The net cultivated land area in 1982-83 was 702.7 thousand hectares which declined to 671.3 thousand hectares in 1987-88 and remained only 662.6 thousand hectares in 1992-93. Accordingly, the gross cropped land area has declined from 1145.2 thousand hectares in 1982-83 to 1099.5 thousand hectares in 1992-93.

TABLE 1

LAND USE PATTERN

(Area in Hectares)

Sl. No.	Land Use	1982-83		1987-88		1992-93	
		Area (000 ha)	Percentage to total reported area	Area (000 ha)	Percentage to total reported area	Area (000 ha)	Percentage to total reporte area
1.	Total reported area	5322.1	100.0	5376.2	5358.8	5358.8	100.0
2.	Forest	4369.7	64.6	3424.2	63.7	3426.5	63.9
3.	Barren and culvable waste land	289.6	5.4	298.7	5.6	296.7	5.5
4.	Land put to non-agricultural uses	118.9	2.2	125.2	2.3	137.0	2.6
5.	Culturable waste	315.9	5.9	319.3	5.9	315.9	5.9
6.	Permanent pastures and other grazing land	217.3	4.1	277.3	5.1	227.5	4.2
7.	Land under miscellaneous llaneous trees groves etc.	185.0	3.5	208.6	3.9	219.9	4.1
8.	Current fallow	20.3	0.4	11.5	0.2	8.4	0.2
9.	Other fallow	32.8	0.6	45.1	0.8	64.3	1.2
10.	Net area sown	702.7	13.2	671.3	12.5	662.6	12.4
11.	Area sown more than once	442.5	-	431.5	-	436.9	-
12.	Gross cropped area	1145.2	-	1102.8	-	1099.5	-
13.	Net irrigated area	207.7 (29.6)*	-	247.9 (36.9)*	-	224.5	-
14.	Total irrigated area	324.9 (28.4)*	-	359.0 (32.6)*	-	374.3 (34.0)	-

* Figures in parenthesis indicate the percentage of irrigated area to net sown area

Source: Directorate of Agriculture, U.P., Lucknow

The potential of water resources in the region are inadequately exploited. On account of unduling topography and hard locky strata it has been not possible to provide irrigation facilities to a larger proportion of cultivated land area. As a result only about one-third of the cultivated land area is reported to have the facility of irrigation in Uttarakhand. Marginal decline, in the net irrigated land area has also been revealed between the period 1987-88 to 1992-93, though, total irrigated area has been considerably increasing from 28.4 per cent in 1982-83 to 34.0 per cent in 1992-93. In fact in most of the districts, excluding Dehradun and Nainital, the share of irrigated land area is much below the average irrigated area for Uttarakhand. The irrigated land area of purely hilly districts together constitudes only 10.28 per cent, even in districts of Pithoragarh and Chamoli the proportion of irrigation land available for cultivation accounts for only 6 per cent and 7 per cent respectively. In district Nainital and Dehradund the net irrigated land area constitutes about 73 per cent and 42 per cent respectively.

CROPPING PATTERN

The main agricultural crops grown in Uttarakhand are paddy, sawan (madua) and pulses in kharif crop season and wheat, barley and masoor in rabi crop season. Foodgrains such as paddy, wheat and pulses are mostly grown in valley areas and areas having irrigation facility. Remaining crops are

generally grown in high reaches where irrigation facilities are not available.

However the land used for the production of various main crops has been declining over the years. This is basically due to the fact that the farmers have increasingly been awared about the economic use of available land with them. In view to maximise the economic gain from their farms, the farmers have generally been practising to use available land in the production of high value crops such as fruits, potato and off season vegetables. As a result the land area under the production of these high value crops, including pulses has been considerably increasing while it has been declining under the traditionally grown low value crops. The decline in the area under traditional agriculture crops has been relatively higher during Kharif crop season, as compared to rabi crop season. During Kharif crop season the farmers are putting a sizeable land area under the production of off season vegitables and pulses such as Soyabeen while vegitables such as Onion, peas and potato are being grown during Rabi crop season. As a result it is noticed that land under the production of traditional crop of Kharif season has declined at 10 per cent as against 8 per cent for Rabi crops but it has increased to 15 per cent alone for pulses which are grown in both the crop season. Land used for the production of barley in Rabi crop season and of Madua in the Kharif crop season has declined at highest proportion of 21.05 per cent and 13.75 per cent respectively. (Table 2).

Thus, the area under the production of pulses has increased from 27 thousand hectares in 1982 to 31 thousand hectares in 1991-92 as a result of shift of land use, particularly, from the cultivation of madua, sawan and barley, which are mainly grown in un-irrigated lands in middle and high mountain areas, to the cultivation of Soyabeen and some other local varieties of pulses. Thus, despite having small size of land holdings, a good number of farming households have opted for a shift from production of

TABLE 2

CROPPING PATTERN

CROP	AREA (000 HA.)		PERCENTAGE CHANGE
	1982-83	1991-92	
Paddy	273	252	7.70
Madus	160	138	13.75
Sawan	85	74	12.94
Maize	38	34	10.53
Total Pulses	27	31	+ 14.81
Wheat	377	353	- 6.37
Barley	38	30	- 21.05

low value foodgrains to the cultivation of high value commercial crops, particularly vegitables and pulses.

Average yield rates of major foodgrains in Uttarakhand are comparatively at lower extent of around 1.61 tonnes/hectares but is still much lower in purely hilly districts, mostly ranging between 0.10 and 13 tonnes/hectare. However, the yield rates of paddy in Uttarakhand are significantly higher (1.98 tonnes/hectare) than the state average of U.P. (1.78 tonnes/hectare). It is primary reflecting due to relatively much higher yield of paddy in Nainital than the state average where it is high as 2.96 tonnes/hectare. Otherwise in remaining districts of Uttarakhand, the yield rates of paddy, as of other major crops, are at much lower level; 1.18 tonnes in Pauri and 1.25 tonnes in Almora. The yield rates of other major crop wheat are only 1.70 tonnes/hectare as against 2.27 tonnes/hectare for state average. It is again highest for about 2.45 tonnes/hectare for district Nainital; while in purely hilly districts it ranges from 0.99 tonnes/hectares for Almora to 1.8 tonnes/hectare for Dehradun. The yield rates of madua are still marginally higher for Uttarakhand (1.27 tonnes/hectare) as compared to state average at 1.26 tonnes/hectare, but the yield rate of barley constitute relatively at lower extent (1.26 tonnes/hectare) for Uttarakhand as against 1.82 tonnes/hectares for the state. Comparing the emerging situation of the productivity of major crops between the neibouring hilly state Himachal Pradesh and the Uttarakhand it revealed that in H.P. the yield rates per hectares for paddy 1.24 tonnes, 0.9 tonnes for wheat and 1.74

TABLE 3

PRODUCTION AND YIELD RATES OF MAJOR FOODGRAINS (1992-93)

(Production tonnes, yield rates, Qtls/hectare)

Sl. No.	District/State	PADDY			MADUA			WHEAT			BARLEY			ALL CROPS		
		Production	Area	Yield Rates	Production	Area	Yield Rates	Production	Area	Yield Rates	Production	Area	Yield Rates	Production	Area	Yield Rates
1.	Almora	43710	35421	12.34	48434	42094	11.51	59498	60183	9.89	6364	6092	10.45	181672	168773	10.76
2.	Nainital	310745	104982	29.60	5703	3629	15.72	290541	122125	24.45	1307	1183	11.72	628706	244497	25.72
3.	Pithoragarh	43333	34857	12.43	25581	9395	13.19	61534	40422	15.22	8247	5873	14.04	152022	114042	13.33
4.	Uttarkashi	16539	10669	15.50	9111	6078	14.99	16478	12422	13.27	622	495	12.57	47369	34363	13.70
5.	Chamoli	25378	18905	13.42	20141	15616	12.90	25490	21835	11.67	2169	1515	14.32	77636	61865	12.55
6.	Tehri Garhwal	23812	16952	14.05	26475	20173	13.13	54843	36165	15.16	4936	3748	13.17	139681	105875	13.19
7.	Dehradun	22881	14662	15.61	5858	3808	15.38	47325	26936	17.57	3110	1671	18.61	104023	64839	16.04
8.	Puri Garhwal	27042	22992	11.76	35107	28522	12.31	43947	38290	11.48	8052	7109	11.33	142889	124361	11.49
	UTTARAKHAND	513448	259440	19.79	176414	139315	12.66	607656	358378	16.96	34887	27686	12.60	1474078	918615	16.05
	U.P.	7909242		17.73	176689	140232	12.60	19834283	8908406	22.26	7370541	404167	18.24	36249341	203970201	17.77

Source: Statistical Diary, Uttarakhand Development State Planning Institute Uttar Pradesh, Lucknow 1995.

tonnes for maize are accounting much less than the yield rates of corresponding crops in Uttarakhand.

Using various indicators of development such as cropping intensity, gross value of agricultural produce per hectare of net and gross area sown and productivity levels of various crops it is further revealed that the level of agricultural development in Uttarakhand is quite unreal and misleading. Included in the eight district of the region are, National and Dehradun which have substantial plain and fertile area and rank among the most developed districts of the state. When the agricultural development of these two districts is excluded from the other six districts of Uttarakhand, the scenario altogether changes. The hill region emerges as one of the agriculturally backward regions of the state. The croping intensity in the purely hilly districts continue to remain highest as compared to all other regions of the state while the level of agricultural development emerges to be the least there. Thus in real sense, the crop cultivation is extremely intensive but return from it are extremely low.[2]

TAGNATION IN AGRICULTURAL DEVELOPMENT

Stagnation in the productivity of foodgrains has been well recognised in almost the district of Uttarakhand, except in the case of Nainital which larger land area is very fertile and over 70 per cent of its net cuiltivated land have the facility of irrigation. The low level of irrigation

facility, lack of improvements in farming technology as suited to terraced farming and unsuitability of land for the use of modern inputs such as fertilized, pesticides and improved variety of seeds, have been the major factor behind the slow increase in crop productivity. The per hectare consumption of fertilizers is noted to be only 74.58 kgs for Uttarakhand in 1993-94, consisting 58.18 kgs nitrogen, 12.92 kgs phosphet and 3.48 kgs potas. However the real fact is that in purely hilly districts the per hectare use of fertilizers is 8 kgs which is comparatively much less than most of the hilly and mountaneous states of India such as Himachal Pradesh (29.17 kgs) Jammu and Kashmir (39.15 kgs) and Manipur (47.42 kgs).[3]

Among the reasons for low productivity of major foodgrains, a poor development and management of water resources is most important. On account of undulating topography and hark rocky strata, it has not been possible to provide irrigation facilities to a larger proportion of cultivalted area. It is reported that only around 34 per cent of cultivated land area have the irrigation facility, though much higher than H.P. (17.9 per cent). In fact, the irrigated land area of six purely hilly districts Almora, Pithoragarh, Chamoli, Uttarkashi, Tehri Garhwal and Pauri together constitutes only 10.28 per cent of the cultivated land area. Lack of irrigation also prevents the use of improved agricultural practices such as fertilizers,

pesticides and improved variety seeds, which are directly associated with increasing agricultural productivity.[4]

Augmenting water resources and bringing additional land area under the facility of irrigation is much difficult in the presently emerging situation of increasing deforestration. A study by Valdia (1996)[5] indicates that in a little less than 50 per cent villages, the spring have either used to yield water or sprout water only during rainy season - when already sufficient rain or surface water is available. Decrease in spring discharge ranging from 25 per cent to 75 per cent and resulting in the spring fed rivers have gone down considerably 30 to 40 per cent in the last one decade or two. Indeed most of the lesser Himalayan rivers and streams are affiliated with too little too much water syndrome. Development of spring santuaries and harvesting of rain water and storage of spring water and seepages could be the only solution of bringing additional land area under the facility of irrigation.

CONCLUSION AND POLICY ISSUES

It has been well recognised that the agriculture is the main source of employment and income for the people of Uttarakhand. But it is unable to provide full-time gainful employment to the labourforce and adequate level of income to the households engaged in it. Yet, the pressure of population on agriculture is consistently increasing due to the scarcity of employment outside agricultural activities.

Law and stagnant yield levels have further accentuated the problem. Given the limited availability of arable land, agriculture may not be able to create additional income and employment opportunities for the increasing population. All the same, better use of the available land can significantly improve the yield rates and income of farming households. The existing land-use pattern and its management have also aggravated the problem of environmental degradation, resulting not only in increasing overall productivity of the land but also its gradual destruction by floods, landslised, and desertification through soil erosion.

Issues related to land-use pattern and land management need to be given foremost consideration in hilly and mountain areas (Banskota 1993).[6] The obvious objective of a land based planning is to allocate the land available for alternative uses and to maximise the returns and per hectare productivity of land (Shah 1986).[7] In the context of Uttarakhand, it implies a basic shift of available land from the production of low-value food crops to production of high-value crops in consonance with the environment and ecology of the region. In effect, it should aim at; (i) a shift in the pattern of the use of land already under cultivation (ii) greater emphasis on horticulture (iii) productive use of deforestrated land; and (;iv) development of grasslands and pastures to support a more productive animal husbandry sector.

There are several concepts and methodologies for land capability classification in mountain areas. Past studies (Khybri 1978[8], Kango 1979[9], and Shah 1986[10]) have divided land in Uttarakhand into different classes on the basis of depth and taxture of soil, the stone-soil ratio, slope of land, and erosion status. However, the forest department of U.P. argued that land capability classification is not of much use for Himalayan areas and instead it uses eridibility characteristics when formulating watershed development plans. For the present purpose, the cultivated land in Uttarakhand could best be classified into two categories, talaon and uproan, the former being relatively flat which fertile soil and endowed with water for irrigation and the latter sloping land, with high stone contents and without any means of assured irrigation. The taloan in the region is used mainly for the production of wheatg during the rabi and paddy during the kharif season; with some land used for growing pulses, oilseeds and vegetables. The uproan land is used for the purpose of growing low-value crops, such as bajra (pearl millet), madua and sawan, mainly during the rainy season. On the talaon land, technological improvements through application of modern inputs would be an appropriate 'strategy for increasing productivity per hectares'.

Productivity of uproan land could also be improved by using appropriate tgechnologies to conserve and improve soil fertility. Among the technologies, using environmentally sould methods for sustainable agricultural development, e.g.,

Sloping Agricultural Land Technology (SALT) has been found to be quite useful in most mountain and hilly areas (ICIMOD 1996)[11] SALT primarily consists of contour farming with the use of appropriate nitrogen-fixing hedgerows. Regular pruning of hedgerows provides biomass for mulching and for improving soil properties. SALT demonstration and implementation programmes could be undertaken with the participation of a number of farmers and involving agricultural extension workers, NGO's, and agricultural departments in different areas of Uttarakhand. Apart from traditional crops, some land could be profitably used for growing potatoes, spices and off season vegetables.

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